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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/519,251

12/22/2004

Ho Sung Kim

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09/05/2008

WOODARD, EMHARDT, MORIARTY, MCNETT & HENRY LLP
111 MONUMENT CIRCLE, SUITE 3700
INDIANAPOLIS, IN 46204-5137

EXAMINER

FEELY, MICHAEL J

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

09/05/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/519,251	Applicant(s) KIM ET AL.	
	Examiner Michael J. Feely	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Pending Claims

Claims 1-7 are pending.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 20, 2008 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Independent claim 1 recites the following limitation: applying a heat treatment to the mixture after the mixture has *substantially cured*. The term *substantially cured* is neither defined

Art Unit: 1796

nor supported by the specification. In fact, the specification is silent regarding any *degree of* curing. This is a new matter rejection.

4. Claims 1-7 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. A *liquid phase* base thermoset component is critical or essential to the practice of the invention, but not included in the claim(s). Such an omission is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

Based on the method set forth in the specification (*bottom of page 2 through page 5*), it appears that a *liquid phase* base thermoset component is required to yield the instantly claimed permanent deformation and compressive residual stress. The Specification fails to provide support for the instantly claimed method featuring a *solid phase* base thermoset component.

5. The previous rejection of claims 1-7 under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling, *stands*. A *specific sequence of process steps* is critical or essential to the practice of the invention, but not included in the claim(s). Such an omission is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

In order to achieve the instantly claimed *permanent deformation and compressive residual stress*, a specific sequence of steps is required, as detailed in the specification (*bottom of page 2 through page 5*). This is illustrated in Applicant's "MEH" material. The following sequential steps are required:

(a) providing a curable mixture including a liquid phase base thermoset component, a curing agent, and expandable hollow microspheres;

Art Unit: 1796

- (b) curing the curable mixture at room temperature, forming a cured product;
- (c) heat treating the cured product at a temperature sufficient to cause the expandable hollow microspheres to expand, yielding a permanent deformation of the microspheres;
- (d) cooling the heat treated cured product, wherein compressive residual stress is created in the cured product around the microspheres.

The instantly claimed method fails to disclose a step of curing the curable mixture at room temperature (at a temperature below the activation temperature of the expandable hollow microspheres).

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: *see rejection above in section 5*.

8. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: (c) a permanent deformation *of* the microspheres; and (d) residual stress created in the cured product *around* the microspheres.

Currently, the instant invention discloses a permanent deformation around the microspheres and compressive residual stress in the mixture. Turning to the Specification (*page*

Art Unit: 1796

4, lines 6-12), Applicant clearly describes a process wherein: (c) heat treatment of the cured product, at a temperature sufficient to cause the expandable hollow microspheres to expand, yields a permanent deformation *of* the microspheres; and (d) cooling of the heat treated cured product creates compressive residual stress in the cured product *around* the microspheres.

Claim Language Suggestions

9. The following is suggested claim language to overcome the rejections under 35 U.S.C. 112, first and second paragraphs:

1. (Currently Amended) A method of manufacturing a thermoset including the sequential steps of: (a) providing a curable mixture including a liquid phase base thermoset component, a curing agent, and expandable hollow microspheres; (b) curing the curable mixture at room temperature, forming a cured product; (c) heat treating the cured product at a temperature sufficient to cause the expandable hollow microspheres to expand, yielding a permanent deformation of the microspheres; and (d) cooling the heat treated cured product, wherein compressive residual stress is created in the cured product around the microspheres.

2. (Currently Amended) The method as claimed in claim 1 wherein the liquid phase base thermoset comprises an epoxy resin.

3. (Currently Amended) The method as claimed in claim 1 wherein said providing includes adding the curing agent to an initial mixture of the liquid phase base thermoset component and the expandable hollow microspheres.

4. (Currently Amended) The method as claimed in claim 3 wherein said initial mixture is heated to reduce the viscosity of the initial mixture before adding the curing agent; and wherein said heating is at a temperature insufficient to cause the expandable hollow microspheres to expand.

5. (Currently Amended) The method as claimed in claim 1 further including the step of pouring the curable mixture into a mould prior to curing.

6. (Currently Amended) The method as claimed in claim 1 wherein the expandable hollow microspheres comprise a co-polymer shell and gas.

7. (Currently Amended) The method as claimed in claim 4 wherein said heated initial mixture is allowed to cool before adding the curing agent.

8. (New) The method as claimed in claim 1 wherein the cooled heat treated cured product is further subjected to a repetition of the sequential steps (c) and (d).

Priority

10. The instant application claims foreign priority to Australian application PS3238, filed June 27, 2002. The Australian document fails to disclose the essential sequence of steps (detailed above) with sufficient specificity. This application is also a national stage entry of

Art Unit: 1796

PCT/AU03/00821, filed June 27, 2003. The PCT document does disclose the essential sequence of steps (detailed above) with sufficient specificity. Accordingly, the effective filing date of the instant invention is June 27, 2003.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Morganelli et al. (US 7,047,633) disclose a similar method wherein a thermoset composition with expandable filler is first B-staged. The expandable filler does not expand during the B-stage process. The B-staged material is subsequently heated and cured during a reflow process. This reflow process causes the expandable filler to expand, yielding closed-cell foam. This closed-cell foam appears to feature *permanent deformation* and *compressive residual stress*, due to the sequence of process steps. The one difference between the instant invention and Morganelli et al. is that the expansion step of Morganelli et al. does not appear to take place in a *substantially cured* material.

Wycech (US Pat. No. 4,751,249) and Erb et al. (US 2005/0027025) disclose processes and products related to the instant invention. However, these prior art references do not disclose an expansion step in a *substantially cured* material. Furthermore, these prior art references do not disclose the above-mentioned sequential steps (a)-(d).

Art Unit: 1796

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Feely whose telephone number is (571)272-1086. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Y. Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael J Feely/
Primary Examiner, Art Unit 1796

September 2, 2008